

840 Ventilator System

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The Puritan Bennett 840™ Ventilator is an evolution in critical care ventilation and the flagship product in our line of critical care ventilators. Compact and lightweight, it delivers sensitive, precise breaths to critically ill neonatal through adult patients. With its high-performance pneumatics, dual-microprocessor electronics and *DualView™* touchscreens, the 840 Ventilator can be upgraded to meet your clinical needs.



PURITAN
BENNETT

840 Ventilator

INTELLIGENT USER INTERFACE

- *DualView™* liquid crystal display (LCD) touch screens display monitored data separately from ventilator settings for easy patient assessment.
- The *SandBox™* screen area lets you set up and review all proposed ventilator and alarm limit settings before you apply them to your patient. You can change any proposed setting or press the CLEAR key to cancel. No settings are applied to the patient until you press the ACCEPT key.
- The *SmartAlert™* Alarm System prioritizes alarm annunciation. Primary alarms are distinguished from secondary, or dependent alarms, helping you to efficiently resolve root causes of alarms.
- The setting for Ideal Body Weight (IBW) establishes boundaries that help prevent application of inappropriate ventilator settings.
- Entering IBW automatically creates default settings and alarm limits, which may either be quickly accepted for rapid setup or adjusted, as needed.
- The 840 ventilator offers an “undo” function that allows you to return to previous settings quickly and easily.

VENTILATOR SETTINGS

Ideal Body Weight (IBW): 7.7 to 330.7 lb (3.5 to 149 kg)

1.1 to 330.7 lb (0.5 to 149 kg) with *NeoMode™* option

Modes: Assist/Control (A/C), synchronous intermittent mandatory ventilation (SIMV), or spontaneous (SPONT). Optional *BiLevel™*

Spontaneous breath types: Pressure supported (PS), none or tube compensation option

Pressure support (P_{SUPP}): 0 to 70 cmH₂O

Flow acceleration %: 1% to 100%

Expiratory sensitivity (E_{SENS}): 1% to 45%

Mandatory breath types: Volume control (VC) or pressure control (PC)

Tidal volume (V_T): 25 to 2,500 mL

Respiratory rate (f): 1.0 to 100 /min

Peak inspiratory flow (\dot{V}_{MAX}): 3 to 150 L/min for IBW > 24 kg;
3 to 60 L/min for IBW ≤ 24 kg

Flow pattern: Square or descending ramp

Plateau time (T_{PL}): 0.0 to 2.0 seconds

Inspiratory pressure (P_I): 5 to 90 cmH₂O

Constant during rate change: Inspiratory time (T_I), I:E ratio, or expiratory time (T_E)

Inspiratory time (T_I): 0.2 to 8.0 seconds

I:E ratio: ≤ 1:299-4.00:1

Expiratory time (T_E): $T_E \geq 0.2$ second

Trigger type: Pressure (P_{TRIG}) or flow (\dot{V}_{TRIG} , *Flow-by®* flow triggering)

Pressure sensitivity (P_{SENS}): 0.1 to 20 cmH₂O below PEEP

Flow sensitivity (\dot{V}_{SENS}): 0.5 to 20 L/min

O₂ %: 21% to 100%

PEEP: 0 to 45 cmH₂O

Apnea ventilation: Apnea mandatory type-volume control (VC) or pressure control (PC)

Apnea flow pattern: Square or descending ramp

Apnea peak flow (\dot{V}_{MAX}): 3 to 150 L/min for IBW > 24 kg; 3 to 60 L/min for IBW ≤ 24 kg

Apnea inspiratory pressure (P_I): 5 to 90 cmH₂O

Apnea inspiratory time (T_I): 0.2 to 8.0 seconds

Apnea interval (T_A): 10 to 60 seconds

Apnea respiratory rate (f): 2.0 to 40 /min

Apnea O₂ %: 21% to 100%

Apnea I:E ratio: ≤ 1.00:1

Apnea expiratory time (T_E): ≥ 0.2 second

Disconnect sensitivity (D_{SENS}): 20% to 95%

Humidification type: Heat-moisture exchanger (HME), nonheated expiratory tube, or heated expiratory tube

Patient circuit type: Pediatric or adult

ALARM LIMITS

High circuit pressure (\bar{P}_{CIRC}): 7 to 100 cmH₂O

High exhaled minute volume ($\bar{\dot{V}}_{E TOT}$): 0.1 to 99.9 L or OFF

High exhaled tidal volume ($\bar{\dot{V}}_{TE}$): 50 to 3,000 mL or OFF

High respiratory rate (\bar{f}_{TOT}): 10 to 110 /min or OFF

Low exhaled mandatory tidal volume ($\downarrow V_{TE MAND}$): 5 to 2,500 mL or OFF

Low exhaled minute volume ($\downarrow \dot{V}_{E TOT}$): 0.01 to 60.0 L

Low exhaled spontaneous tidal volume ($\downarrow V_{TE SPONT}$): 5 to 2,500 mL or OFF

MONITORED DATA

Breath type: Indicates the type (control, assist or spontaneous) and phase (inspiration or exhalation) of the breath being delivered

Delivered O₂ %

End expiratory pressure ($P_{E END}$)

End inspiratory pressure ($P_{I END}$)

Exhaled minute volume ($\dot{V}_{E TOT}$)

Exhaled tidal volume (V_{TE})

I:E ratio

Maximum circuit pressure ($P_{CIRC MAX}$)

Mean circuit pressure (\bar{P}_{CIRC})

Spontaneous minute volume ($\dot{V}_{E SPONT}$)

Total respiratory rate (f_{TOT})

Rapid shallow breathing index

Mean inspiratory flow

T_I/T_{TOT} ratio

Integral waveforms function includes choice of:

- Pressure-time curve, flow-time curve, volume-time curve, or pressure-volume loop (one or two waveform curves or one pressure-volume loop can be displayed at the same time). Pressure-volume loop automatically calculates inspiratory area. All waveforms can be frozen.
- Adjustable baseline and vertical/horizontal axis scales
- Waveforms are automatically displayed and frozen when you press INSP PAUSE or EXP PAUSE. In INSP PAUSE, the calculated values for compliance and, when possible, resistance, are displayed after the inspiratory pause. In EXP PAUSE, the measured values for intrinsic and total PEEP are displayed during and after the expiratory pause.

VENTILATOR STATUS INDICATORS

High-urgency alarm: Blinking if active, steadily lit if autoreset
Medium-urgency alarm: Blinking if active, turns off if autoreset
Low-urgency alarm: Steadily lit if active, turns off if autoreset
Normal operation
Normal breath delivery unit operation
Ventilator inoperative
Normal graphic user interface operation
Loss of graphic user interface
Safety valve open
Backup Power Source (BPS) ready
Ventilator operating on BPS
BPS charged/BPS charging
Compressor ready
Compressor supplying air to the ventilator

OTHER KEYS AND INDICATORS

Screen lock key: When lit, touching the screen or offscreen controls has no effect until you press screen lock again. New alarms automatically unlock the screen and controls.
Alarm volume key: Adjusts alarm volume (alarm volume cannot be turned off)
Alarm silence key: Silences alarm sound for 2 minutes
Alarm reset key: Clears active alarms or autoresets high-urgency alarms, cancels an active alarm silence, and is recorded in the alarm log
? key: Displays basic operating information about the ventilator
100% O₂ / CAL 2 min key: Delivers 100% oxygen (if available) for 2 minutes and calibrates the oxygen sensor
MANUAL INSP key: Delivers one manual breath to the patient according to the current mandatory settings
EXP PAUSE key: Allows you to measure auto-PEEP (not functional in SPONT, and has no effect during the inspiratory phase of a breath)
INSP PAUSE key: Allows you to perform static mechanics maneuvers
Knob: Adjusts the value of a setting. A button that is highlighted means that the knob is linked to that setting.
CLEAR key: Cancels a proposed setting
ACCEPT key: Applies proposed settings

WARRANTY

One year parts and labor

ENVIRONMENTAL SPECIFICATIONS

Pneumatic Gas Sources

Air and oxygen: Must be supplied at 35-100 psi (241-690 kPa)

Temperature

Operating: 50°F to 104°F (10°C to 40°C) at 10% to 95% relative humidity, noncondensing

Storage: -4°F to 122°F (-20°C to 50°C) at 10% to 95% relative humidity, noncondensing

Atmospheric pressure

Operating: 10.2 to 15.4 psi (700 to 1,060 hPa)

Storage: 7.3 to 15.4 psi (500 to 1,060 hPa)

Altitude

Operating: -1,350 ft to 10,000 ft (-443 m to 3,280 m)

Storage: up to 20,000 ft (up to 6,560 m)

PHYSICAL CHARACTERISTICS

Weight

Breath delivery unit (BDU): 40.1 lb (18.2 kg)

Graphic user interface (GUI): 12.6 lb (5.7 kg)

Backup power source (BPS): 14.6 lb (6.6 kg)

Cart: 34.2 lb (15.5 kg)

Compressor: 55 lb (25 kg)

Dimensions

BDU: 13" H x 18" W x 10" D (330 mm H x 457 mm W x 254 mm D)

GUI: 18.1" H x 15.5" W x 6.7" D (460 mm H x 394 mm W x 170 mm D)

BPS: 3.25" H x 9.6" W x 10" D (83 mm H x 244 mm W x 254 mm D)

Cart: 39.3" H x 22.9" W x 23.7" D (998 mm H x 582 mm W x 602 mm D)

Compressor: 16.4" H x 18" W x 14.25" D (417 mm H x 458 mm W x 362 mm D)

Connectors

Inspiratory limb connector: ISO 22-mm conical male

Expiratory limb connector (on expiratory filter): ISO 22-mm conical male

Air and oxygen inlets: DISS

Oxygen sensor life: Two years or 10,000 hours of use, nominal (actual life depends on operating environment; operation at higher temperature or FIO₂ levels will result in shorter sensor life)

Gas mixing system

Range of flow from the mixing system: Can be set to 150 L/min standard temperature and pressure, dry (STPD) for patients >24 kg and up to 60 L/min for patients ≤24 kg. Additional flow is available up to 200 L/min for compliance compensation.

Leakage from one gas system to another: Meets standard EN 794-1

Operating pressure range: 35 to 100 psi (241 to 690 kPa)

Alarm volume

Approximately 45 db(A) to 85 db(A)

COMPLIANCE AND APPROVALS

The 840 Ventilator System was developed in accordance with pertinent FDA guidances, and North American and international standards.

The ventilator's IEC 601-1 classification is Protection Class I, Type B, internally powered, drip-proof equipment, continuous operation.

The ventilator meets all requirements for Electromagnetic Compatibility (EMC) under the IEC 601-1-2 standard including CISPR II, Group I, Class B.

Authorized to bear the Canadian Standards Association (CSA) certification mark with NRTL/C indicator, signifying the product has been evaluated to the applicable Underwriters Laboratories Inc. (UL) and CSA standards, for use in the U.S. and Canada.

Certified by CSA to the following North American standards (120 V units):

CSA C22.2 No. 601-1 + Supplement 1

CSA C22.2 No. 601-2-12

UL No. 2601-1

Certified by CSA to the following international standards and requirements under the CB Scheme:

IEC 601-1 + Amendments 1 and 2

IEC 601-2-12

POWER**Input power**

Ventilator operation without compressor and with Fisher & Paykel MR730
Humidifier: 120 V ac, 60 Hz; 4.5 A

Ventilator operation with compressor and with Fisher & Paykel MR730
Humidifier: 120 V ac, 60 Hz; 10.1 A

Mains overcurrent release

Ventilator: 5 A

Auxiliary mains: 10 A

NOTE: Above values obtained using the following ventilator settings at 72°F (22°C) ambient temperature: mode, A/C; mandatory type, PC; IBW, 85 kg; f, 20/min; P_{SUPP} , 30 cmH₂O; T_I , 1 second; flow acceleration %, 50%; O₂ %, 50%; $P_{CIRC MAX}$, 50 cmH₂O; P_{SENS} , 3 cmH₂O.

Leakage current

Earth leakage current: 120 V ac operation: 300 µA max

Enclosure/patient leakage current: 120 V ac operation: 100 µA max

Patient auxiliary leakage current: Not applicable; no applied parts

Humidifier leakage current: 220 to 240 V ac operation: 100 µA max

802 Backup Power Source (BPS): 24 V dc, 6.5 Ah

Operating time (for a new, fully charged battery): At least 30 minutes
(actual duration depends on ventilator settings, battery age, and level of battery charge)

Recharge time: Automatically recharges within 8 hours maximum while ventilator is connected to ac power

Shelf life: 24 months from date of manufacture

Storage conditions: Store at -4°F to 122°F (-20°C to 50°C), 25% to 85% humidity, avoid direct sunlight

Recharge requirements: Recharge every 6 months when storage temperature is 5°F to 84°F (-15°C to 29°C), every 3 months when storage temperature is 86°F to 104°F (30°C to 40°C), every 2 months when storage temperature is 105°F to 122°F (41°C to 50°C)

NOTE: BPS battery life specifications are approximate. To ensure maximum battery life, maintain full charge and minimize the number of complete discharges.

Ordering Information**840 VENTILATOR AND SOFTWARE OPTIONS**

To order, call your local Puritan Bennett sales representative.

STANDARD ACCESSORIES

Flex arm	4-032006-00
Inspiratory bacteria filter	
Reusable (<i>Re/Flex</i> ,™ each)	4-074600-00
Expiratory bacteria filter and collector vial	
Reusable filter (<i>Re/X800</i> ,™ each)	4-070305-00
Reusable collector vial (<i>Re/X800</i> , each)	4-074647-00
Test hose	4-018506-00
Test lung	4-000612-00
802 Backup power source (BPS)	4-070520-00

SELECTION REQUIRED

Oxygen hose assembly, DISS (U.S.)	4-001474-00
Air hose assembly, DISS (United States)	4-006541-00
Power cord (North America)	4-071420-00
Operator's and technical reference manual	
English	4-075609-00
Spanish	4-070147-00

OPTIONAL ACCESSORIES

Service manual, English	4-070089-00
Wall air water trap kit	4-075315-00
Patient breathing circuit	
Reusable, adult, with heated wire, for Fisher & Paykel	G-061235-00
Reusable, adult, without heated wire	G-061208-00
Reusable, pediatric, with heated wire, for Fisher & Paykel	G-061237-00
Reusable, pediatric, without heated wire	G-061223-00
Inspiratory bacteria filter	
Disposable (<i>D/Flex</i> ,™ carton of 12)	4-074601-00
Expiratory bacteria filter and collector vial	
Disposable filter (<i>D/X800</i> ,™ carton of 12)	4-070315-00
Drain bag, disposable (package of 25)	4-048491-00
Drain bag tubing, disposable (package of 10)	4-048493-00
Clamp, reusable (package of 5)	4-048492-00
Drain cap	4-074613-00
Seal, expiratory filter	4-070311-00
Mounting kit, humidifier, Fisher & Paykel 480/730	4-075313-00
Cart, ventilator	4-076102-00
Oxygen sensor*	4-072214-00
Battery replacement kit	4-070523-SP
10,000-hour preventive maintenance kit* BDU/GUI	4-079046-00
10,000-hour preventive maintenance kit* compressor (For specific part numbers, call your local Puritan Bennett sales representative or 1-800-635-5267.)	
Filter, compressor inlet	4-074374-00

* Oxygen sensor to be replaced every 2 years or as necessary by a qualified service technician. Preventive maintenance kits must be installed by a qualified service technician.

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Healthcare

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